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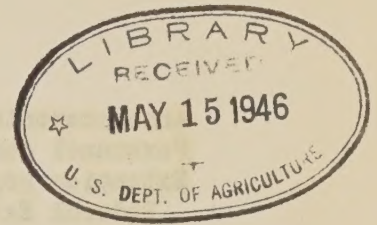
June 1939

No. 2

The

EXTENSION

ENTOMOLOGIST



Twenty-five years ago the Smith-Lever bill was signed. The enactment of this legislation tied together the extension phases of work in the U. S. Department of Agriculture and the many land-grant colleges. This step was not taken blindly. The Farmers' Cooperative Demonstration Work of the U. S. Department of Agriculture, established in 1904 for the purpose of meeting conditions brought about by the advent of the boll weevil in Texas and Louisiana, together with the extension work in many other States, had shown that there was a definite place for such work.

When the ravages and spread of the boll weevil continued to threaten the cotton industry, extension work had so demonstrated its value that Congress, guided by public sentiment, supported the Smith-Lever Bill, and on May 8, 1914, it was signed by President Wilson. However, it may be interesting to note that 62 bills similar to this one had been previously introduced in Congress. Since the enactment of this legislation, the personnel of the Extension Service has continued to grow. At the present time, there are about 8,700 extension workers associated with the U. S. Department of Agriculture and land-grant colleges.

M. P. Jones

M. P. Jones
Extension Entomologist

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE AND
EXTENSION SERVICE, COOPERATING

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ANNOUNCEMENTS1939

June 28 to 30. Pacific Slope Branch Meeting, Stanford University, Palo Alto, Calif.

August 13-18. Rocky Mountain Conference of Entomologists, University of Colorado Science Camp, Ward, Colo.

PERSONNEL CHANGESWashington Extension Office.

Under the realignment, the functions of the subject-matter division of the Washington Extension Office will be under the supervision of J. L. Boatman. For administrative purposes this work has been divided into two sections, namely: the Agricultural and Home Economics Section, consisting largely of A. B. Graham's former subject-matter section with Samuel P. Lyle now in charge; and the Economics Extension Section, under the direction of H. M. Dixon.

Mr. Boatman received a B. S. degree, 1921, and M. S. in 1925 from Iowa State College. He was with the Iowa Agricultural Experiment Station from 1921 to 1925. In the fall of 1925 he was appointed extension agronomist and served in that capacity until December 1935, when he accepted a position with the Soil Conservation Service as State Coordinator in Iowa. In the spring of 1937 he was appointed regional agronomist by Soil Conservation Service for the States of Wisconsin, Minnesota, Iowa, Illinois, and Missouri. He also served as extension representative on the Triple A State Board of Review in 1934 and 1935. On April 16 of this year he was appointed to the above position.

Mr. Lyle received his B. S. degree at Kansas State College and his M. S. degree at Iowa State College. He served as head of the departments of agricultural engineering at Arkansas State College, Jonesboro, and the University of Georgia at Athens. In 1930 he was appointed extension agricultural engineer with the Extension Service, United States Department of Agriculture. In 1938 he transferred to Rural Electrification Investigations of the Bureau of Agricultural Engineering, and on March 1, 1939, accepted his present position.

EXTENSION ORGANIZATION

To show graphically the functions of the various branches of the Federal Extension Service and their relation to each other, a diagram is presented on an adjacent page.

FEDERAL EXTENSION SERVICE

C. W. Warburton, Director
Reuben Brigham, Assistant Director

W. A. Lloyd, Principal Agriculturist H. W. Gilbertson, " " C. L. Chambers, " "	M. M. Thayer, Chief, Division of Business Administration W. H. Conway, Associate Chief, Division of Business Administration
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DIVISION OF FIELD COORDINATION H. W. Hochbaum, Chief

Organization and Planning Section
H. W. Hochbaum Acting in Charge

Surveys and Reports Section
M. C. Wilson In Charge

DIVISION OF SUBJECT MATTER J. L. Boatman, Chief

Agricultural and Home Economics Section
S. P. Lyle, In Charge

Economic Section
H. M. Dixon In Charge

DIVISION OF EXTENSION INFORMATION Reuben Brigham, Acting Chief

Agricultural Exhibits
J. W. Hiscox In Charge

Visual Instruction and Editorial
L. A. Schlup In Charge

Motion Pictures
Raymond Evans In Charge

ARTICLES

Vegetable Insect Control Publicity in 1938

R. W. Leiby
Ithaca, New York

The publicity phase of our extension work was done through (1) the 24 issues of the Weekly News Letter mailed to county agents and research workers during summer months, (2) special articles to county agents for use in their monthly Farm Bureau News issues, (3) press articles, (4) radio talks, (5) extension and station bulletins, (6) insect exhibits at county fairs, and (7) public talks.

The Weekly News Letter comprised a total of 101 single-spaced mimeographed pages. Aside from being timely and informative on vegetable insects, on their appearance and development in various parts of the State, it serves as a bound reference volume on the status of vegetable insects for the year.

Eleven articles on vegetable and field-crop insects were mailed to county agents. With most articles, column-wide mats illustrating the stages of the insect were offered to agents for use with the articles in farm bureau news publications or in their newspapers. (These mats cost about 3 cents each in lots of 50. They are readily prepared from a zinc etching made from suitable line drawings, and greatly enhance the reading of the accompanying article. They have also been used in 4-H publications without an accompanying article, but with a suitable legend limited to control of the insect.)

An appreciable number of articles were used by county agents in various ways, and it is felt these accomplished a positive good. Copies of these articles were also used extensively in answering office correspondence.

Six special articles were prepared for individual use of as many county agents in their county press or in an issue of their News. These articles concerned insecticides and insect problems peculiar to the county.

Eleven press articles were prepared and released to the department of information and publicity. Press clippings indicate that they were widely used. In two articles illustrative mats accompanied the stories which were released to a total of 750 newspapers. It was estimated by the department of publicity that one of these stories reached one million five hundred thousand readers.

Four radio talks were given over stations WGY and WESG. Seven additional radio briefs were supplied to the publicity extension service.

Three extension bulletins on vegetable and field-crop insects were revised during the year.

The extension insect exhibit was used by three county agents in as many counties during the year. It was displayed also at the Syracuse meeting of the State Vegetable and Potato Growers' meeting in connection with the Cornell and Geneva exhibits. Insect exhibits invariably attract public attention and afford easy opportunity for extension contacts and consequent insect-control explanations.

Four talks of a scientific nature not otherwise mentioned above were given during the year.

Control the Potato Leafhopper on Peanuts

F. W. Poos

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine

Injury by the potato leafhopper, Empoasca fabae (Harris), to alfalfa, beans, potatoes, and certain other crops is well known in many parts of the United States. It is not well known that this insect causes considerable injury to the peanut crop and decreases the yield of field-cured nuts materially. It is little wonder that peanut growers are not familiar with this small active leafhopper, for it is inconspicuous and feeds largely on the lower surface of the leaves. Peanut growers should therefore be informed regarding the losses caused by this insect and encouraged to use control measures against it.

Results of experiments in the control of this insect on peanuts were reported in the *Journal of Economic Entomology* 30(3): 561, 1937, and further details of the work carried on in Nansemond County, Va., during the period 1934-1937 are presented in Bulletin 316 of the Virginia Agricultural Experiment Station. For details of this work the reader is referred to this bulletin, in which it is recommended that for the control of this leafhopper three applications of bordeaux mixture as a spray should be applied while the plants are dry. This recommendation is the preferred one for growers having a satisfactory sprayer available and an easily accessible water supply. Another satisfactory method of control recommended is the application of sulfur dust, preferably while the peanut vines are damp. The sulfur should be finely ground (98 percent passing through a 325-mesh screen) and should contain approximately 2 1/2 percent inert material in order to prevent lumping so that the dust can be applied freely with the ordinary type of dusting equipment.

The quantity of sulfur dust or bordeaux mixture spray to use will depend to a large extent upon the growth made by the peanut plants. It is important to cover the lower as well as the upper surfaces of the leaves. Approximately 50 to 60 pounds of the sulfur dust per acre or

250 to 300 gallons of the bordeaux mixture spray should be ample for three applications to the average growth of peanut vines.

The first application of either of these insecticides under Virginia conditions should be made early in July depending upon the size of the peanut plants and the number of leafhoppers present. The second application should follow the first in approximately 3 weeks, depending on the growing season. In experiments at the experiment farm of the United States Department of Agriculture, at Arlington, Va., during the seasons of 1937 and 1938, where peanut leaf spot was almost entirely absent, it was found that the leafhopper populations declined rapidly on peanuts after August 10. In spite of this fact considerable loss in yield of nuts was recorded on the untreated plots in these experiments as compared with the yield obtained from the treated plots. In a season favorable to the development of peanut leaf spot, a third application of bordeaux mixture or sulfur dust should be made approximately 3 to 4 weeks after the second application has been made.

Because of the greatly increased yields obtained by the use of bordeaux mixture or sulfur on peanuts, it was considered probably that these treatments not only controlled the leafhoppers and leaf spot but also had a direct stimulating effect on the plants. However, greenhouse tests in the absence of leafhopper or leaf spot showed no significant difference between the weights of treated and untreated plants. It is therefore evident that the greatly increased yields obtained from the treated outdoor plots were mainly due to the control of these pests. This emphasizes the importance of controlling the potato leafhopper, which appears to be responsible for a much greater loss of field-cured nuts than has previously been attributed to it.

ANNUAL REPORT EXCERPTS

Bedbugs Rout the Hens

That might be a good topic, for in one house there were enough bedbugs to furnish the State with a start. The farmer had neglected his hen house for several years and wondered why the hens ran from it. When the house was cleaned out lock, stock, and barrel, that is, all the roosting poles, nest boxes, and the straw loft, bugs were found on everything. The poles, nest boxes, and straw had to be removed and burned. Everything about the hen house was covered with bugs and bug eggs. It was no wonder that the bugs had got into the bedrooms of the dwelling. That meant a real house cleaning. Finding this hen house so badly infested with bedbugs in late July was sufficient reason to put on a publicity campaign and to notify every county agent of the pest and the remedy. That campaign for removing bedbugs from hen houses might have been somewhat responsible for the treating of the 26,355 houses with the creosote oil. Whether or not it was for bedbugs, it got them as well as the mites that might have been lurking in the dark, just waiting for the hens to come home to roost.

The cleaning up of the poultry houses in Kansas was not all due to the efforts of the entomologist for there were two very good cooperators in the two extension specialists in poultry. These men emphasized the necessity of cleaning up the hen houses before good stock could be grown.

-- Kansas Entomology Annual Report, 1937.

Training Junior Entomologists

This was our pet project, but suffered, like the others, from neglect because of the grasshopper work. It had been our intention to hold two meetings at different times with the boys in each county selected. We were able to hold but one in each county early in the season. In the counties of Smith, Nueces, Lubbock, and Wheeler we found the interest especially good. Nueces and Wheeler were two counties whose boys prepared exhibits and participated with creditable showing in our first year's club insect contest at the summer short course at College Station in 1937. We will repeat this work in 1938 as the boys and county agents have expressed themselves as very much desiring it in the four counties mentioned besides the counties of Freestone, Ellis, Goliad, and El Paso. These participated in the work last year, and we will also inaugurate it in Hidalgo County, which did not participate last year, since they especially requested it and have an especial interest in this phase of work. We will start out thus with only 9 counties this year as against 12 last year and hope that by concentrating on this reduced number and as a result of this weeding process, we can make a real showing of the possibilities another year.

-- Texas Entomology Annual Report, 1937.

Correspondence Course in Beekeeping

The beekeeping correspondence course issued in 1933 and revised in 1935 has been a popular one. Since May 1933 this course has ranked among the first in enrollment of farm correspondence courses offered by the University. Beekeepers from over 45 States, as well as students from Canada, Turkey, South Africa, British West Indies, New Zealand, Palestine, Egypt, Hawaii, China, Korea, Australia, England, and Cuba have enrolled in the course. The subject material in the correspondence course has been organized in 12 lessons under the following headings:

- A general introduction to beekeeping
- How to start in beekeeping
- The organization of a colony and its activity as a unit
- Brood diseases of bees
- Spring management of the apiary
- Extracted honey production
- Comb-honey production
- The preparation of honey for the market and the marketing of honey
- Fall management of bees
- The wintering of honeybees
- The rearing of queens; The introduction of queens; Increase
- Insect pollination of orchard fruits

During the past year the correcting of the lessons has increased from 2,150 lessons for 1936 to 2,300 for 1937. Because of the number of lessons to be corrected, and due also to the increasing duties of the specialist, it has been necessary to have an assistant to correct the correspondence lessons. The specialist has kept in close contact with the progress of the students in the course.

The response from the students seems to show that even though they consider the course rather difficult and requiring a great deal of their time, they feel that they have received much valuable instruction which results in making bookkeeping a more profitable and enjoyable enterprise to them.

-- Ohio Entomology Annual Report, 1937.

Some Important Points Learned From 1938 Grasshopper Campaign

1. That lots of moisture, in itself, does not kill grasshoppers, at least after the first instar.
2. That regardless of the amount of vegetation that optimum growing conditions will produce, grasshoppers will take it all, if they are numerous enough.
3. That flesh fly seems to operate only in restricted areas, and does not spread fast enough to check the grasshoppers before damage is done.
4. That every farmer, with machine spreaders, can kill all the grasshoppers that hatch on his farm, if he has a sufficient amount of bait at the right time.
5. That the campaign to be effective must be started on time, and effectively maintained.
6. That grasshoppers did not hatch out on grasshopper-infested land that was well plowed before May 1.
7. That stubble fields are favorite hatching grounds for grasshoppers.
8. That grasshopper bait is safe to use if handled according to directions.
9. That young grasshoppers in second and third instars take bait readily even when vegetation is succulent.
10. That fungus disease does not inevitably operate with what we have thought to be optimum moisture and temperature for its development.

SUGGESTIONS FOR FUTURE CAMPAIGNS

1. Conduct a more complete survey of all land in the county for grasshopper eggs.
2. Destroy grasshopper eggs in cultivated area.
3. Discourage stubbling in of crops where survey shows high concentration of grasshopper eggs.
4. Carry on thorough educational campaign during winter, stressing the point that modern agricultural methods favor grasshopper outbreaks, hence the necessity for artificial control.
5. Have sufficient bait and other materials on hand by May 15 to make coverage on all noncultivated infested areas.
6. Organize community spreading groups using machine spreaders.
7. Give necessary outside assistance in case local population unable to make coverage.
8. Have central mixing plant with capacity to serve spreaders while hoppers are small.
9. Urge early seeding of grasshopper-resistant crops.
10. Make cultural control the primary campaign. Poisoning a "mopping up" practice.

-- South Dakota Entomology Annual
Report, 1938.

Posts

There is still much to be done in educating the women in some of the counties on moths. They know so little about the clothes moth and its habits that it is difficult for them to know how to rid their homes of moths. Some discussion on moths is always given when the dry-cleaning demonstration is given. Since synthetic fabrics and weighted silks are so much in use, the women are having difficulties with garments being damaged by red ants and cockroaches. This, of course, is more a matter of proper storage than anything else. Twelve of the major counties reported 366 homes free from moths on account of the clothing program.

-- Mississippi Clothing Annual Report,
1937.

COUNTY AND HOME DEMONSTRATION AGENT ANNUAL REPORT EXCERPTS

Orchard Insect Control

Three hundred and forty-five fruit growers received ten circular letters giving specific information on apple-insect-control practices and five circular letters on peach-insect-control practices. These letters were mailed to growers just prior to the time for applying the sprays, and the information contained in the letters was regulated by careful observation in orchards throughout the county.

Eight meetings were conducted, with an attendance of 755, at which J. O. Pepper, extension entomologist, gave timely suggestions on orchard-insect-control problems.

Eight orchard-insect-control demonstrations were conducted as follows: Aphis control by using tar oil-oil emulsion in the dormant period was tried in the orchards of Messrs. Lippy and Lucabaugh. A careful check up throughout the summer and this fall indicated that both aphis and red mite and San Jose scale were successfully controlled with the use of this spray material.

Pistol casebearer presented a real problem in several orchards, and in the Taylor orchard and the Blue Ribbon Orchard special applications of a 1-percent summer oil were used, which gave relatively good results. However, it was evident that one application of summer oil was not sufficient to completely clean up the insect. Neighboring orchards that are infested with pistol casebearer showed decidedly heavy injury, while the orchards receiving the summer oil application showed very slight, if any, injury from the insect.

A demonstration on the control of scurfy scale was carried out in the Walters orchard where a severe infestation of scale was causing many of the limbs to die. Concentrated lime sulfur with 12 gallons to the hundred had been used with no apparent success. A rather heavy application of a 4-percent oil spray during the dormant period in the spring appeared to give a very satisfactory kill of the scale, although it probably will be necessary to repeat the oil spray for at least another year.

Three codling-moth demonstrations were conducted on the farms of Messrs. Topper, Garretson, and Raffensperger. Bait pails were used in two of the orchards for the purpose of securing information on the life cycle of the moth. The apple trees are carefully scraped and banded with chemically treated bands, and four cover sprays were applied in these orchards. A careful count was made of the fruit; the Raffensperger orchard had 1-percent injury, the Lucabaugh orchard 3-percent injury, and the Topper orchard, 21-percent injury to codling moth.

-- County Agent Annual Report, Adams
County, Pa., 1937.

Cut-Ant Control

Seven cut-ant control demonstrations were held in as many communities, with 170 farmers and farm boys present. The vocational class of D'Hanis and Hondo High Schools took part in the demonstrations. Seven different colonies of cut ants were treated with "highlife," under the able instruction of R. R. Reppert, entomologist of the Extension Service.

The vocational classes of Hondo and D'Hanis High Schools reported that 850 cut-ant towns were treated with 2,000 pounds of highlife at a cost of \$300. A conservative estimate of this work in Medina County is \$4,250.

The simple method used by Mr. Reppert to kill cut ants was the big hit of the day as it does not require much labor to do the job.

-- County Agent Annual Report, Medina County, Texas, 1937.

The Mexican Bean Beetle

The Mexican bean beetle has made it almost an impossibility to raise beans here for the past several years. Efforts were made to get local dealers interested in handling the material. By the end of June some 20 or more persons had used the rotenone sulfur dust on Mexican bean beetle and the ordinary cabbageworm with 100-percent kill in every case. As a result of the information presented at this one garden tour, it appears now that the principal obstacle to the raising of beans has been overcome and the folks in the county are taking hold of it in a lively manner. During the season, 72 persons obtained small hand dusters and used the rotenone sulfur dust. Not a single case was reported where the material failed to control Mexican bean beetle and cabbageworm. It was not so effective on the leafhopper.

-- Indiana County Agent Report, Crawford County, Ind., 1937.

Armyworm Control

While this was not a bad year for the farmers of Payne County, yet it was not all smooth sailing by any means.

The first real pest to show up was the armyworm, and they are indeed well named because they seem to appear millions in number. They seem to come from every direction and go everywhere. We started as quickly as possible to wage the fight but that was not soon enough, because millions of the hungry worms were cleaning the country as they went, and they did thousands of dollars worth of damage.

At this time we had stored in our care about 6 tons of bran and several drums of poison material to be used in the grasshopper campaign. We immediately asked for permission to use this material in fighting the armyworms. Through the assistance of Mr. C. F. Stiles, extension entomology specialist, the material was released for use in a few days. Farmers came in, forming a working crew, and poison was rapidly mixed. We put out 5,000 pounds of material within 2 weeks' time. The worms ate the poison, and results were obtained almost immediately.

We visited Mr. Thomas, a farmer living near Ripley, on the following day after he had applied poison. The worms had crossed the alfalfa field and had attacked the potato field. They were just striking the first row when he applied the poison. We found practically no live worms on the day of our visit, but literally thousands of dead worms. We counted 65 dead worms under three potato vines. Where treatment was given, the worms were easily controlled.

-- County Agent Annual Report, Payne
County, Okla., 1937.

Cotton Flea-hopper Control

Cotton demonstrations, both adult and junior, were outstanding this year in agronomy work. They were well planned and carried out and demonstrated the effectiveness of soil conservation.

The use of crop rotation to control root rot and insects has been increasing. The cotton flea hopper has continually become more serious during the past few years. A series of eight meetings were held in the county in May, attended by 378 farmers, where the latest information was given regarding flea-hopper control with dusting sulfur. Interest created at these meetings resulted in over 8,000 acres of cotton being systematically dusted, mostly by farmers who had never done this before. Results were satisfactory, and as an example of increased yields, J. C. Park, of Rice, reports an increase of 100 pounds of lint cotton per acre at a cost of \$2.50 per acre. E. P. Estes, of Roane, reports a 50-percent increase in yields in his community where cotton was dusted at the proper time. Other cotton work has been in regard to staple improvement, with preliminary work having been finished and committees working to organize one-variety communities.

-- County Agent Annual Report, Navarro
County, Tex., 1937.

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Boll Weevil Control

As a result of the extension news letters giving the boll-weevil situation in the coastal counties early in the spring of 1937, as well as the boll-weevil emergence report from the Florence Experiment Station, the county agent became aware of the extreme danger from boll-weevil damage to cotton this year.

A systematic use of circular letters, boll-weevil infestation reports from committeemen, and the use of the daily paper were made in acquainting the farmers of Greenwood County with the local situation in June. Committeemen and other interested people as well as farmers themselves were urged to report the names of farmers using sweetened poison and the approximate number of acres of cotton to be poisoned. These names and figures were reported to the newspaper every 3 days for a period of nearly 3 weeks. It is felt that this publicity was extremely effective in enlisting a large number of farmers in the fight of the boll weevil.

The Greenwood County campaign to fight the boll weevil opened on June 10, at which time five field demonstrations in mixing and applying sweetened poison were given in scattered sections of the county.

A total of 81 boll-weevil counts were made by the county agent and a few trained reporters. The infestations in the county developed as follows:

<u>Date</u>	<u>Farms counted</u>	<u>Boll weevils per acre (average)</u>
June 10	14	170
June 15	11	262
June 18	11	268
June 21	8	263

Although the active campaign opened on June 10 and closed before the month was out, a total of 66 farmers had been reported through the newspaper as having decided to use sweetened poison on 3,004 acres of cotton.

The county agent feels that this piece of work was most effective and bore as great a return as any that he has undertaken in several years. The yield in the fall of 1937 was so much greater where two or three applications of poison were used that hardly a man can now be found who will discredit the value of this work. The summary and analysis of the sixteen 5-acre cotton-staple-improvement demonstrations in the county as reported on pages 17 and 18 of this report clearly show that the application of two or three mixtures of sweetened poison gave the largest yield of cotton per acre and also returned the greatest profit per acre. In fact the profit per acre from the eight demonstrations where two and three applications of poison were used was \$30.67 as compared with \$17.40 from the six demonstra-

tions where one or less applications of poison were used. This is an increase in net returns per acre of more than 75 percent and certainly shows the value of this practice.

-- County Agent Annual Report, Greenwood
County, S. C., 1937.

Household Pest Control

Demonstrations were given on household-pest control in the month of June. Formaldehyde poison and the fly trap were used as demonstrations for the eradication of flies. Formaldehyde poison was effective and worth while where the home was sanitary and only a few flies in the homes. Where homes are without screens I doubt if it would be practical, because my demonstrations, even though some flies were killed, were not satisfactory. In an unscreened home flies find other food they like better than the poison bait. Use of the fly trap is a very satisfactory method of eradicating flies.

The women appreciated the study of household insect pests, and many of them applied themselves diligently to the task of killing pests and learning about them in Methods of Control of Household Pests, by Stiles.

Demonstrators enrolled21
Reporting21
Fly traps made14

Name of pests:

Bedbugs, fleas, cockroaches, silverfish, ants, mico, chiggers, cereal insects, moths, flies, termites.

Methods used:

For bedbugs--sprayed with gasoline served temporarily.
Fleas--sprayed roosts and floors with creosote; very effective for sticktight fleas.
Cockroaches--used sodium fluoride mixed with flour; partial success.
Moths--sunned, brushed, cleaned, and then used naphthalene; very successful.
Silverfish--used sodium fluoride powder, 100 parts wheat flour to 12 parts powder; partial success.
Houseflies--used formaldehyde poison, one-half cup milk, one-half cup water, a little syrup, and 1 tablespoon formaldehyde; mix. Also used fly traps and screens.
Mosquitoes--destroyed breeding places; successful.
Bean beetles--fumigated with carbon bisulfide.
Red mites (chiggers)--flowers of sulfur in the stockings; successful.
Mice and rats--barium carbonate; successful.

-- Home Demonstration Agent Annual Report,
Cherokee County, Okla., 1937.

TIMELY TOPICS

Imported Parasites of Corn Borer Well Established and Spreading in Eastern States

Mr. Clark says that at the close of 1937 five larval parasites of Pyrausta nubilalis Hbn., imported from Europe and the Orient, had become established in the eastern portions of the territory infested by the European corn borer and that four of these species had spread over a considerable area. The tachinid Lydella grisescens R. D. was found over an area of at least 837 square miles, and the ichneumonid Inareolata punctoria Roman. had dispersed over an area of not less than 756 square miles. The polyembryonic braconid Macrocentrus gifuensis Ashm. continued to increase rapidly in numbers and this parasite had become present in an area of over 278 square miles in southeastern Massachusetts. Chelonus annulipes Wesm., a braconid which attacks the eggs of the borer and subsequently destroys the host larva, was recovered from an area of 85 square miles, although it is probably present over a much larger area. The ichneumonid Cremastus flavoorbitalis (Cameron) maintained itself in Massachusetts but failed to increase in measurable numbers. A maximum parasitization by all species of 56.3 percent was recorded from one collection of borer larvae made at Taunton, Mass., in the fall of 1937. In order to obtain the above data on establishment and spread of parasites, collections totaling 21,190 larvae of the corn borer from Massachusetts, Rhode Island, Connecticut, New Jersey, and Virginia were reared.

Butterfly Pictures

A method for making beautiful butterfly pictures is contributed by J. N. Knull, curator of insects, Ohio State University, Columbus, Ohio.

"Some years ago I found that it was possible to make pictures using butterfly wings which compared quite favorably with those on sale at the art stores.

"A heavy grade of good celluloid is selected for the painted area. It is quite easy to lay the celluloid down on a design and paint the upper surface to correspond to the drawing beneath. The parts which are to be filled in with butterfly wings are left blank.

"A good grade of oil paint mixed with a drier can be used for the color areas. The solid black parts may be painted with auto retouch. It requires several days for the paint to harden enough for the picture to be assembled.

"After the paint is thoroughly dry the butterfly wings are placed on the back of the piece of celluloid with household cement.

"When the design is finished the celluloid with butterfly wings attached on the back, is placed between two pieces of glass and framed.

"My first picture was made 8 years ago and is still as bright as it was when it was assembled."

Electrocuting Farm Flies

G. H. Dacy, in *Electricity on the Farm* (August) reports that in Florida "electric fly traps have proved remarkably successful in the abatement of the fly evil. Thomas and Reasoner, successful Dade County dairymen, who milk as many as 300 grade Guernseys and Jerseys, report that the latest fly-electrocution devices are highly efficient, much superior to the pioneer types of flycatchers, which were objectionable because they shorted out too easily. This is the eighth year that these milk producers have yoked electricity for fly killing. Despite that molasses is a constituent both of the dairy feed and beet pulp which they use, their milking stables and pastures are outstandingly free of horn flies and similar pests. One of the fly traps is located in the spacious feed room which accommodates several carloads of dairy feed. The flies which penetrate to that storehouse are attracted to the insect-killer by an electric bulb which is illuminated during the feeding and milking periods. The pesky flies settle on the wires of the trap, lured there by the light, or are electrocuted by venturing too close. The odor of frying flies attracts more of the trespassers, which meet similar fate. Dead flies on occasion have been removed by the quart from the vicinity of this efficient and economical fly trap. Outside the milking stable two other electric fly traps are mounted at strategic points where flies tend to congregate....The dairymen also carry the campaign back to the source of origin of many of the flies such as manure accumulations and other refuse. This debris and fertilizer are cleaned up regularly and thoroughly in order to reduce and control the breeding grounds of the flies."

Sulfur and Sulfur-Pyrethrum Dusts Most Effective Against Potato Leafhopper on Beans

N. F. Howard, of the Columbus, Ohio, laboratory, reports that in comparing the efficiency of several dust mixtures and sprays against *Empoasca fabae* (Harr.) on beans during the course of experiments in Ohio in 1938, it was shown conclusively that dusts of undiluted sulfur or a dust mixture made up at the rate of 90 pounds of sulfur and 10 pounds of pyrethrum containing 0.9 percent of total pyrethrins gave best results in controlling this pest. Sprays containing basic copper arsenate, basic copper sulfate, sulfur nitride, and derris (0.015 percent of rotenone) were each ineffective. The addition of peanut butter to derris-dust mixtures increased their effectiveness, but these mixtures were not as efficient as undiluted sulfur or the sulfur-pyrethrum dust mixture. In general, the sulfur dusts were superior to sprays containing different materials.

Fumigation of Clothing for Killing Ticks

As a result of numerous inquiries concerning methods of deticking clothing worn by hikers or others who have occasion to traverse tick-infested territory, a series of tests was made in the Washington laboratory. Using a 30-pound apple can as a fumigating chamber it was found that 100-percent mortality in unengorged *Dermacentor variabilis* (Say)

placed among clothing in the chamber occurred when 1 teaspoonful of either carbon disulphide or carbon tetrachloride was exposed in the chamber for 8 hours with the lid of chamber sealed with adhesive tape or made tight by putting it on over a sheet of wrapping paper. J. M. Brennan, J. L. Webb, and H. L. Trembley collaborated in making the tests.

Cashew Nutshell Oil Versus Mosquitoes

Mr. Stage further reports: "Several tests, both in the laboratory and in the field, show this oil to be highly toxic and certainly a promising new material. Sprays were made up of this material with 95 percent kerosene and also with 95 percent Diesel oil and used under severe field conditions. From 85-percent to 95-percent kills were obtained when these mixtures were applied at the rate of 12.5 gallons per acre of water surface."

Kerosene-Pyrethrum Emulsion Retains Toxicity to Mosquito Larvae for Long Periods

H. H. Stage, of the Portland, Oreg., laboratory, reports that tests with a kerosene-pyrethrum emulsion showed that this material had not lost its toxicity to third- and fourth-instar larvae of laboratory-reared Aedes vexans Meig. and Aedes aldrichi Dyar and Knab, when applied at the rate of 25 gallons per acre, even after this material had remained in storage for 5 years.

Derris and Cube of Little Value as Stomach Poisons Against Japanese Beetle

W. E. Fleming and E. D. Burgess, of the Japanese beetle laboratory at Moorestown, N. J., have reported on tests conducted during the summer of 1938 with various materials as stomach poisons against Japanese beetles. Comparative tests were made with derris and cube having the same rotenone content (4 percent) and practically the same percentage of total extractives (14 and 16 percent, respectively). Neither material appeared to have any appreciable value as a stomach poison. Derris, however, has a high rating as a repellent to the beetle, and the tests indicated that for repellent purposes, either cube or timbo could be substituted for derris, provided the rotenone content of the materials was about 4 percent and the total extractives about 16 percent.

Plum Curculio Enters Hibernation by Midsummer

As jarring peach trees after harvest in 1935 and 1936 for marked curculios and diligent searches under peach trees and around the border of peach orchards during the late summers of 1936 and 1937 failed to locate plum curculio adults, Oliver I. Snapp and J. R. Thomson, Jr., undertook an investigation at Fort Valley, Ga., this year to determine definitely where the curculio is after the harvest of the last-maturing variety of peach in that locality. About 1 month after harvest a quantity of fallen leaves was raked up from a hedgerow bordering an Elberta peach orchard in which the population of new (first-generation) curculios had been very heavy dur-

ing peach harvest. Examination of this debris yielded a number of curculio adults, indicating that adults of this insect begin to enter hibernation in midsummer in central Georgia, within a month after the completion of peach harvest. This is the reason why in some years very few curculios are found on peach trees shortly after harvest.

Wheelbarrow Sprayer

What looks to be an item of real interest for the nurseryman, berry grower, or fruit grower with a small planting, is the new wheelbarrow sprayer. This compact outfit has a porcelain-lined pump that delivers 225 pounds pressure. The one-half horsepower, 4-cycle engine is air-cooled and has a hand lever starter. An electric motor can be substituted for the engine if the sprayer is to be used where current is available. The unit is balanced on an all-steel, arc-welded frame which, along with the rubber-tired wheel, makes for easy operation. Agitation of the spray material in the tank is accomplished by movement of the suction pipe and strainer. (American Fruit Grower, April.)

Variety Trends of Apples

The American Fruit Grower (October) reports that it instituted a Nation-wide apple-variety survey--the first of its kind. "More than 70 of the country's leading nurseries cooperated by reporting those varieties of apple trees which are in greatest demand for new plantings," it says, "and since the varieties of trees now being planted will determine the apple production 10 to 15 years from now, growers can use this survey as a guide to a planting program." For early varieties, it reports: "In all but two sections Yellow Transparent heads the list. Second place in national rating goes to Duchess, but this variety is being overshadowed in some northern areas by Early McIntosh and in the south by Red June and Red Astrachan." For midseason varieties: "By far the favorite is the McIntosh. It is the leader in every section except the South and North Central States, but ranks second even in the latter area. National rating shows Cortland and Wealthy second to McIntosh." For late varieties: "Delicious, all types, leads by greatest margin in this group and is almost twice as popular as its nearest contender, Jonathan. Other popular late varieties include Stayman, Yellow Delicious, Rome Beauty, Grimes Golden, Baldwin, Northern Spy, Winesap, and York Imperial."

Propagation by Etiolation

"Pacific Coast orchardists and nurserymen have been watching with interest a new method of propagating apple trees from stem cuttings recently developed by scientists of the United States Department of Agriculture," says J. H. Currie in Country Gentleman (June). "In the past, nurserymen have produced commercial apple trees by grafting the desired variety to seedling rootstocks, because apple cuttings of stem tissues would not take root. With this new method, stem cuttings of apple varieties are induced to form root initials or points of origin on the stem that promptly develop into roots when the cuttings are taken from the tree and set in

the soil, thus eliminating grafting. Dr. F. E. Gardner, in charge of nursery stock investigations for the Bureau of Plant Industry, describes this new process as 'etiolation.' In this new method of propagation the growing apple shoot is wrapped in black tape when it starts to put out leaves in the spring. A piece of tape about 3 inches long is usually sufficient to wrap four or five times spirally around the young shoot as near the growing tip as possible. All growth is made in complete or nearly complete absence of light. This shoot is removed in the fall, the tape taken off, a basal cut made in the etiolated area, and it is ready to be set out. So far, scientists have not been able to determine why etiolation should favor the production of roots on stem tissue."

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Introduction

The following report is a summary of the work done during the year 1955. It is divided into two parts: a general survey of the work done and a detailed account of the results of the various experiments.

General Survey

The work done during the year 1955 was of a general nature. It was aimed at obtaining a better understanding of the various factors which influence the rate of reaction between the various components of the system.

Experimental Results

The results of the various experiments carried out during the year 1955 are given in the following tables. They show the effect of the various factors on the rate of reaction and on the yield of the various products.

Conclusions and Recommendations

From the results of the various experiments it can be concluded that the rate of reaction is influenced by the various factors mentioned above. It is recommended that further work be done on these factors in order to obtain a better understanding of the reaction mechanism.

The work done during the year 1955 has shown that the rate of reaction is influenced by the various factors mentioned above. It is recommended that further work be done on these factors in order to obtain a better understanding of the reaction mechanism.

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